

# IMPACT OF BIOGAS DIGESTERS ON COOKHOUSE VOC EXPOSURE IN KENYAN FARMWOMEN

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**Background and Aims:** Women living on rural Kenyan farms rely on wood for cooking. These women are exposed to elevated concentrations of volatile organic compounds (VOC) and respirable particles due to a combination of poor ventilation in the cookhouse and inefficient wood combustion. Biogas digesters anaerobically convert livestock manure into methane for cooking, reducing the need for traditional open-fire cooking, and potentially reducing wood smoke exposure. The objective of this project was to compare VOC exposure for Kenyan smallholder farmwomen with and without biogas digesters.

**Methods:** A sample of 31 farms with biogas digesters and 31 farms without digesters (matched on family size, farm size, and the age of the cooking woman) were selected. The woman responsible for the majority of the cooking on each farm wore a passive thermal desorption tube (TDT) for 7 days whenever cooking. The TDTs were packed with a Tenax TA™ polymer sorbent. Participants recorded the time spent each day cooking with either wood or methane. The TDTs were analyzed, in Canada, by thermal desorption-gas chromatography with flame ionization/electron capture detection to determine the VOC concentrations in each cookhouse.

**Results:** The control group spent significantly more time ( $p < 0.01$ ) exposed to wood smoke compared to the biogas group, but similar amounts of time cooking ( $p > 0.2$ ). Of the 54 individual VOCs tested, 20% ( $n = 11$ ) had concentrations that were significantly different between the two groups ( $p < 0.05$ ), with X VOCs being significantly higher in the control group. These concentrations were also significantly higher than levels in the ambient environment ( $p < 0.05$ ).

**Conclusions:** Compared to women without biogas digesters, women with biogas digesters spent less time exposed to wood smoke, and had lower concentrations of some VOCs in their cookhouses. Continual off gassing from the cookhouse structures could be responsible for the similarities in the other VOC concentrations.